DOCUMENT RESUME

ED 368 724 SP 035 173

AUTHOR Stang, Lucas; Miner, Kathleen R.
TITLE Nutrition. Health Facts.
INSTITUTION ETR Associates, Santa Cruz, CA.
REPORT NO ISBN-1-56071-186-8
PUB DATE 94
NOTE 84p.; For other volumes in the Health Facts series, see SP 035 174-182.
AVAILABLE FROM ETR Associates, P.O. Box 1830, Santa Cruz, CA 95061-1830 ($12.95).
PUB TYPE Books (010) -- Guides - Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Athletics; *Body Image; Dietetics; *Eating Habits; *Exercise; *Foods Instruction; *Health Education; Health Materials; Health Promotion; *Nutrition; Nutrition Instruction; Resource Materials; Secondary Education
IDENTIFIERS Comprehensive School Health Programs

ABSTRACT

The 10-volume "Health Facts" series is intended to supplement to health education curricula and provide a handy reference for individuals who would like additional background information on particular health topics. The emphasis is on topics and examples relevant to youth of middle and high school age. The five sections in this book provide teachers with basic facts about: the types and components of food; the most recent guidelines for eating a healthy diet; the association between diet and disease; the relationship between body image and weight control; and special dietary issues associated with exercise and sports. An easy to read reference format offers clear, concise data intended to familiarize educators with the most important facts about the issues and concerns. A glossary, a list of resources, and 20 references complete the volume. (LL)

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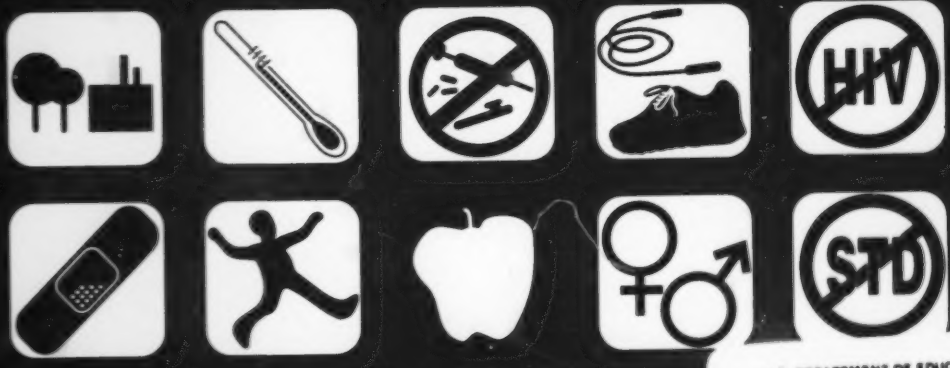

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Nutrition

HEALTH FACTS

Lucas Stang

and

Kathleen R. Miner, PhD, MPH, CHES

ETR ASSOCIATES
Santa Cruz, California
1994

ETR Associates (Education, Training and Research) is a nonprofit organization committed to fostering the health, well-being and cultural diversity of individuals, families, schools and communities. The publishing program of ETR Associates provides books and materials that empower young people and adults with the skills to make positive health choices. We invite health professionals to learn more about our high-quality publishing, training and research programs by contacting us at P.O. Box 1830, Santa Cruz, CA 95061-1830, 1-800-321-4407.

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Published by ETR Associates, P.O. Box 1830,
Santa Cruz, California 95061-1830

Printed in the United States of America
Designed by Ann Smiley
10 9 8 7 6 5 4 3 2 1
Title No. H306

Library of Congress Cataloging-in-Publication Data

Stang, Lucas.
Nutrition : health facts / Lucas Stang and Kathleen R. Miner.
p. cm.
Includes bibliographical references.
ISBN 1-56071-186-8
1. Nutrition. I. Miner, Kathleen Rae, 1946– II. Title.
QP141.S6263 1994
613.2—dc20 93-41014

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Editor's Preface

Everyone agrees that children and youth need to learn skills for establishing good health habits. Most people also agree that the earlier health education starts, the better its success.

The books in the *Health Facts* series were written to provide the background information educators need as they teach young people about health. The information is provided in a way that makes it easy for educators to familiarize themselves quickly with the most important facts about a health topic.

Rather than providing indepth information in each content area, the books offer guidance to the balance of emphasis. They help educators approach health topics with confidence and focus health content as they teach.

Titles in the Series

Each volume in the series contains information about a different content area. The following ten books comprise the series:

- *Disease Prevention*
- *Drug Use Prevention*
- *Environmental and Community Health*
- *Fitness*
- *HIV Prevention*
- *Injury and Violence Prevention*
- *Mental and Emotional Health*
- *Nutrition*
- *Sexuality*
- *STD Prevention*

Contributors

These books were written by the following talented and knowledgeable professionals in collaboration with ETR Associates' staff.

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Acknowledgments

We would like to thank the following people, who provided reviews and content expertise.

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In addition, we would like to thank Mary Nelson, publisher of ETR Associates, for the concept idea, Kathleen Middleton, editor-in-chief of ETR Associates, for her review and conceptualization, and Jill Schettler for her help in editing.

Netha Thacker
Project Editor

Introduction

Good nutrition is fundamental to human health, performance and well-being at every age and stage of life. Not only is it a prerequisite for optimal growth and development, it is also essential for the promotion and maintenance of health, prevention and treatment of disease, and recovery and rehabilitation from illness.

—U.S. Public Health Service

The current generation of Americans have a greater number of food options than at any other time in history. In the 1920s, most grocery stores sold about 850 food items. The contemporary supermarket stocks more than 13,000 food items.

In addition to the standard commodities of fresh dairy products, meat, vegetables and fruits, today's supermarkets sell foods that are precooked, packaged, processed and fortified. These foods have a wide variety of nutrient and non-nutrient components, including salt, sugar, sugar substitutes, fat, vitamins, minerals, artificial colors and flavorings, preservatives,

emulsifiers and stabilizers. Some of these additives enhance the quality of the food, while others detract from it.

As a greater variety of foods became available, many Americans were changing the way they lived. Unlike the past, when most meals were prepared at home, many Americans now regularly choose fast-food restaurants with drive-through and take-out windows. Although foods prepared by restaurants can be very satisfying, it takes some care to ensure that the food is also nutritious.

Eating is necessary for sustenance, health, happiness and general well-being. Eating is often part of life's major social events. Birthdays, holidays, weddings, anniversaries, parties and funerals are usually accompanied by food.

However, the mere consumption of food, no matter how gratifying or expensive, does not ensure wholesome nutrition. Achieving adequate nutrition requires paying attention to the quantity, quality and balance of the foods that are eaten. Poor food choices contribute to adverse conditions such as obesity, high blood pressure and dental caries.

Proper nutrition helps promote health and prevent disease. Improper dietary practices are implicated in five of the ten leading causes of death in the United States: heart disease, cancer, stroke, diabetes mellitus and atherosclerosis. Conversely, diets that are high in fiber and complex carbohydrates and low in fat and salt may decrease the risk of breast cancer, colon cancer, hypertension, heart disease and diabetes.

Making wise food choices is complicated by economics, personal and cultural preferences and the changing lifestyles of the American population. Americans have a lot of freedom when it comes to their food options. They are able to select foods that are convenient, fit their individual tastes, and suit their lifestyles. However, this freedom involves both risk and responsibility. To promote health, Americans must pay attention to the caliber of their own diets. Adults and society must

also assume the responsibility for helping America's "fast-food generation" of children cultivate life-long patterns of healthy food choices.

Nutrition: Health Facts provides educators with basic information about healthy dietary practices. The book presents a brief overview of the types and components of food and outlines the most recent guidelines for a healthy diet. It describes the association between diet and disease, the relationship between body image and weight control, and the special dietary issues associated with exercise and sports.

The Role of Education

The research conducted during the past thirty years has offered greater insight into the causes of chronic disease, injury and violence. This research indicates that these conditions are primarily caused by human behavior. What people do or do not do places them at risk of acquiring chronic diseases or experiencing serious injuries.

The behavioral components associated with the modern pattern of disease and injury create the potential for preventing most of these health problems by changing behavior. Comprehensive health promotion and education programs provide the foundation for modern disease prevention.

Ideally, the health promotion and education process begins early. Early education provides the opportunity to reach children and youth before they begin to adopt the behaviors associated with chronic disease, sexually transmitted disease, drug use, injury and mental illness. Through a systematic review of health promotion and disease prevention, educators can help children and youth enhance their health while helping them avoid illness and injury.

The *Health Facts* Series

Nutrition: Health Facts is part of a ten-volume series designed to provide clear, concise content and to be complementary to curricula published by ETR Associates and other health education curricula. Other volumes in this series that relate to nutrition include *Disease Prevention* and *Fitness*.

Classroom teachers, counselors, school nurses and others are often called upon to become instant health educators. They may be asked to answer questions, present information and lead discussions on health topics in which they feel unprepared.

The *Health Facts* series is designed to be a handy reference for individuals who would like additional background information on particular health topics. The emphasis is on topics and examples that are relevant to youth of middle and high school age. By design, the presentation of each of the topics is brief. References and resource listings direct the reader to additional relevant information. All of the volumes in this series offer a user-friendly format that is easy to read and factual.

The volumes discuss health and disease in straightforward language. Educators may want to review each volume for its appropriateness for their school and community before assigning the books for student use.

This book and the rest of the series can serve as useful additions to classroom, school or library collections. Health care professionals may choose individual volumes or the entire series as a convenient reference for patient education programs or as reading material in office waiting rooms. Individuals may find the series useful as a home reference as well.

BASICS OF NUTRITION

MYTH: Today's foods are so processed and refined they've lost their health value.

Fact: Most of the changes in food processing have been beneficial. Taste and texture of food have been improved, and several nutrients are now added to many commonly eaten foods, such as breads and cereals.

Good nutrition is basic to good health. The foods people eat provide for basic nutritional needs, which include:

- water for cells
- fuel for energy
- material for physical growth and development
- material for body maintenance and repair
- substances that regulate metabolism

Nutrients are the building blocks of the human body. The body is essentially made of the same nutrients as foods. Nutrients can be divided into the following six classes:

- water
- carbohydrates
- fats (lipids)
- proteins
- vitamins
- minerals

Water

Water is the one substance every living thing must have. Every cell in the body requires water to stay alive. A person deprived of water will die in just a few days. Water makes up about 40% to 60% of the body's weight, depending on age and sex. An average person's body contains 45 liters of water.

Water has many functions. It is an important solvent, meaning that many substances can be dissolved in water. The water in blood allows it to flow, carrying nutrients and oxygen to the body's cells. Blood also removes waste products from the cells. Water assists in digestion, respiration and reproduction. It is an important part of many of the chemical reactions that occur in the body. Water helps keep all nutrients and cellular components in appropriate concentrations (which allows for the internal operation of all cells).

Water helps maintain a stable body temperature. It distributes heat and cools the body as it evaporates from the skin. Under normal conditions, the body loses about a pint of water a day through perspiration. However, during exercise in hot weather, a person can lose three gallons in a single day.

The body uses water as a vehicle to remove wastes, principally through the urine but also in the feces. The lungs also excrete water during respiration. In cold weather, this loss of water becomes visible as condensation in the breath.

Although the amount of water loss fluctuates, the body must excrete enough water to remove wastes. This loss of water must be balanced by replacing the water by eating and drinking.

Nearly all foods contain water; some are up to 90% water. Beverages, fruits and vegetables are major sources of water in the diet. As the body breaks down nutrients for energy, some water is released, but the bulk of the body's water must come from drinking. About a quart of water each day is excreted by the body, so at least this amount should be drunk each day to replace it.

Carbohydrates

Living things use carbohydrates to supply energy, which originally came from the sun. Energy is needed by all living things. Foods high in carbohydrates are obtained almost exclusively from plants; milk is the only exception.

Carbohydrates are the major component of most human diets. They provide the body's most important source of energy, and nutritionists recommend that at least 50% of food energy consumed should be in the form of carbohydrates, preferably from starches.

Carbohydrates are high-quality fuels because it takes little effort to release their energy. Most carbohydrate-rich foods are good sources of vitamins and minerals, too. Carbohydrates are described as being simple or complex.

- Sugars are **simple carbohydrates**. They include glucose, fructose (fruit sugar), galactose, lactose (milk sugar), maltose and sucrose (table sugar). Sugars dissolve in water, taste sweet and form crystals.

  Body cells prefer glucose for energy. In fact, all digestible carbohydrates are eventually converted to glucose. However, sugar needs to go through the digestive process before it is available to help meet the energy needs of the body.

Excess glucose can be stored for future use either in the form of fat or as another carbohydrate, *glycogen*, which is stored in the liver and muscles. The body can use carbohydrate that is not used for energy to make other important substances such as fats and amino acids.

- **Complex carbohydrates** include starches, glycogen and some forms of fiber. Current Food and Drug Administration recommendations suggest that 40% to 50% of daily Calories should come from complex carbohydrates.
  - **Starch** is found in seeds and large fleshy roots. Pasta, rice, wheat, corn, potatoes and other traditional staple foods are composed mainly of starches. Starches provide an economical way for the body to obtain the energy it needs for daily living.
  - **Glycogen** is a special form of starch that is stored in the liver and muscles. It is used as a reserve energy source. The liver easily converts glycogen to glucose for circulation throughout the body.
  - **Dietary fiber** is found only in vegetables, fruits, beans, peas and grains. Fiber passes through the body essentially unchanged. It contributes to the bulk that eases the passage of solid waste products through the digestive tract.

Artificial Sweeteners

A variety of synthetic substances are used to sweeten foods. These substances neither promote tooth decay nor add many Calories to the diet. However, some artificial sweeteners, such as saccharin and cyclamates, have been linked to health problems.

Aspartame, best known by its NutriSweet trade name and the most widely used artificial sweetener, is the equal of sucrose in Calories; however, since it is more than 200 times sweeter than sucrose, it takes only a tiny amount to sweeten any food.

The Food and Nutrition Board of the National Academy of Sciences suggests that a daily diet should include 20 to 35 grams of fiber derived from unprocessed, fiber-containing foods. Such a diet might include three to five servings of whole grain breads and cereals, three servings of vegetables (including cooked dry beans and peas) and two or three servings of fruit. Researchers aren't sure how, but people who eat high-fiber foods seem to be protected against colon cancer.

Fats (Lipids)

Although the correct term is *lipids*, most people refer to the family of compounds that include solid fats and oils simply as fats. At least a trace of fat, in the form of fatty acids, is present in almost all foods, but some foods—such as seeds, nuts, soybeans, meats, poultry, chocolate and milk products—are naturally high in fat. Humans like fatty foods and tend to eat more than they need.

All body cells contain fat. However, the body fat people are most familiar with is a huge collection of long-term storage molecules meant to conserve energy for times when ample food is not available. These packets of energy are stored throughout the body in expandable *adipose* (fat) cells, which mass together to form adipose tissue. Adipose tissue provides:

- insulation against cold
- energy for muscles
- a layer of padding between skin and muscles
- a cushion to protect delicate internal organs

Certain lipids are essential for healthy skin and hair, normal infant growth and nervous function, and the production of certain hormones and hormone-like substances called *prostaglandins*. Some dietary fat is needed to absorb vitamins from the digestive tract. Body fats help to circulate these vitamins

in the bloodstream. However, nutritionists recommend that no more than 20% to 30% of daily calories should be from fats. Too much fat in the diet is associated with heart disease, excess body fat and certain cancers.

Proteins

The term protein comes from the Greek *proteios*, meaning "of prime importance" or "that which takes first place." Many body functions depend on proteins, which are found in every cell.

Although proteins are of great importance, the American diet has traditionally been over-filled with protein-rich foods. A diet with either too much or too little protein can be unhealthy.

Proteins are made up of *amino acids* that the body uses to make skin and internal structures such as muscle and bone. Proteins are needed to repair damaged tissues, to make antibodies and certain hormones, and to regulate fluid balance. Children who suffer from protein deficiency appear swollen because fluid leaves the blood and collects in the spaces between cells, especially in the trunk and extremities.

Excess proteins do not build more muscles. The excess is burned for energy, just as carbohydrates are. An excess of protein may increase calcium losses (in urine). Excess protein may aggravate the conditions of people with liver or kidney disease.

The *antibodies* that help fight disease are protein molecules transported in blood. People without adequate body protein have very low resistance to infections. Many *hormones*, which act as chemical messengers in the body, are also derived from proteins. *Hemoglobin* is a blood protein that transports oxygen to cells throughout the body.

There are twenty amino acids that the human body can use. The body can make eleven of the amino acids it needs by itself. The remaining nine are called *essential amino acids*. These are amino acids that the body cannot manufacture or cannot make in the amounts needed; they must come from food.

A food protein that supplies all nine essential amino acids in sufficient quantity is called a *complete protein*; an incomplete protein is one that does not supply enough of all nine essential acids. Almost all proteins from animal sources are complete, while plant protein sources are incomplete.

However, in certain cases, incomplete proteins can be combined to provide the missing essential amino acids. For example, beans and rice, when eaten together, form a complete protein. Proteins that compensate for each other's missing amino acids are called *complementary proteins*.

Small amounts of complete proteins can also be mixed with large amounts of incomplete proteins to enhance the value of the incomplete protein. This combination allows the body to use the incomplete protein. Macaroni and cheese and many ethnic dishes use this principle.

Growth and Maintenance

Muscle, skin, hair and other structural elements of animals' bodies are made largely or entirely of protein. All proteins are composed of amino acids, which the body uses to make more proteins, from which it then constructs new tissues.

Normal, healthy cells need to be replaced, too; over time, they simply wear out. Red blood cells, for example, last for about three or four months before being replaced by new cells made in the bone marrow. Cells that line the intestinal tract live for only three days, so they are constantly being shed and replaced. Skin cells die or rub off and new ones grow underneath. Proteins supply the amino acids for maintaining and replacing these cells and the working parts within them.

Vitamins

Vitamins are compounds that help regulate body processes. Because all but vitamin D cannot be made by the body, vitamins must be obtained from the diet. However, only small amounts are necessary for biological action. Excesses supplied by dietary supplements can be toxic.

Thirteen vitamins are known to be important for human nutritional health. These are divided into two classes: *fat soluble* (vitamins A, D, E and K) and *water soluble* (the B vitamins and vitamin C). Fat-soluble vitamins can be stored in the body until the body needs them. Water-soluble vitamins must be supplied by the diet daily.

Vitamins are the most fragile of all nutrients. Often, their structures can be destroyed by even the most subtle chemical change. For example, vitamins may be destroyed if a food is stored too long, overheated, exposed to air or even soaked in water.

Minerals

About 4% of the human body (roughly six pounds in an adult man) is made of mineral elements, originally derived from rocks in the earth's crust. About sixty different minerals enter the human body, either dissolved in water or from eating plants and animals that contain them.

Not all minerals have a biological function; some are contaminants. About 25 minerals have a known role in human health, generally as structural components such as calcium in bones and teeth or as metabolic regulators.

Minerals that are needed in very small amounts are called *trace* minerals. This group includes iron, iodine, zinc, copper, manganese, fluoride, chromium, selenium and molybdenum.

Minerals that are required in large quantities are called *major* minerals. Calcium, phosphorus, magnesium and chloride are examples of major minerals.

The classifications, however, do not mean that one group is more important than the other. A deficiency in a trace mineral can be just as serious as a deficiency in a major mineral. All essential minerals play specific roles. Some studies indicate that maintaining proper levels of certain minerals can help prevent problems such as cardiovascular disease, diabetes and high blood pressure.

Essential Nutrients

Essential nutrients are those the body must get from food because it cannot make its own from other raw materials. They include:

- some forms of carbohydrate
- certain fatty acids
- nine amino acids
- 12 vitamins
- about 25 minerals
- water

Food Energy and Calories

Energy is defined as the capacity to do work. There are three nutrients that can be burned, or *oxidized*, to release energy:

- carbohydrates
- fats (lipids)
- proteins

The energy is released when cells chemically burn, or *metabolize*, the nutrients. This energy can be measured in *calories*—literally, the amount of heat released from a molecule of food. Scientifically, the calorie measure people are most familiar with is really a *kilocalorie* or kcal, a unit of 1,000 calories. This unit is often written as "Calorie." For example, a fried chicken breast yields 364,000 calories or 364 kcal. For simplicity, people often write "364 cal." when they are referring to 364 kilocalories, or Calories.

A gram of any digestible carbohydrate and a gram of protein each contain about four Calories of food energy. Fats are the most Calorie-dense nutrients, with nine Calories per gram.

Most foods contain mixtures of all of the nutrients. However, foods are usually classified by the energy-yielding nutrient that predominates in the food. For example, meat is classified as a rich protein source even though it also contains fat. Corn is a rich carbohydrate source, but it also contains fat and protein. Only sugar, which is almost pure carbohydrate, and oil, which is almost pure fat, can be called single-nutrient foods.

1-Minute Facts

- The foods people eat provide for basic nutritional needs.
- Nutrients can be divided into six classes: water, carbohydrates, fats (lipids), proteins, vitamins, minerals.
- Water is the one substance every living thing must have.
- Carbohydrates provide the body's most important source of energy.
- Fats are the most Calorie-dense nutrients.
- Many body functions depend on proteins, which are found in every cell.
- Vitamins help regulate body processes. Except for vitamin D, vitamins cannot be manufactured by the body.
- Essential minerals are components of body structure and help regulate body function.
- Essential nutrients must be obtained from food because the body cannot produce them.
- A Calorie measures the amount of energy released as the body oxidizes the energy-producing nutrients—carbohydrates, lipids and proteins.

GUIDELINES FOR HEALTHY EATING

MYTH: Snacking is an unhealthy habit.

Fact: Nutrient-dense snacks—foods that are high in complex carbohydrates, vitamins and minerals and low in fat, sugar and salt, such as fresh fruits and vegetables—can be an important part of daily eating.

Every food contains different types of nutrients in different amounts. However, certain groups of foods are rich sources of nutrients that they have in common. For example, meat and fish are in the same food group because they are both high in protein.

The key to good nutrition is to eat a wide variety of nutrient-dense foods. Nutrient-dense foods have a lot of nutritional value—vitamins, minerals, protein, complex carbohydrates—in relationship to their Calorie value. Skim milk is an example of a nutrient-dense food. Ice cream is also made from milk, but most of its energy comes from fat and sugar.

Selecting foods from a variety of food groups can help ensure that a diet includes all the key nutrients. However, within

each food group, foods can be categorized as having high nutrient density, good nutrient density or lower nutrient density. For example, a plain baked potato is more nutrient-dense than French fries, and French fries have a better nutrient density than potato chips. The charts on the following pages show the nutrient density of some common foods.

Foods in the high nutrient density category should be eaten most often. Foods from the good nutrient density category round out the day's food intake. Foods with low nutrient density are often described as *junk food*, a term that should be avoided; even a candy bar contributes some nutritional value. However, these foods should be eaten only occasionally, so they don't displace more nutrient-dense foods from the diet.

Food Choices

Many factors influence the kinds of foods people choose to eat. Most of these factors are behavioral or social, including:

- **Personal preference:** People eat what they like.
- **Habit:** People eat familiar foods, foods they frequently eat.
- **Ethnic heritage or tradition:** People eat foods associated with their cultural or ethnic group.
- **Social pressure:** Sometimes people feel they can't refuse foods they are offered in social situations.
- **Availability:** People eat more of foods that are plentiful.
- **Convenience:** People sometimes choose foods because they are quick and easy to prepare.
- **Economy:** People usually eat the foods they can afford.
- **Positive associations:** People sometimes choose foods that are eaten by people they admire or because these foods indicate status.
- **Emotional needs:** People may feel better when they eat certain foods.
- **Nutritional value:** People eat certain foods because those foods are healthy.

Nutrient Density of Foods

Breads, Cereals and Other Grain Products

High Nutrient Density	Good Nutrient Density	Lower Nutrient Density
Bagels Bread sticks Whole grain or enriched breads English muffins Cooked cereals Ready-to-eat unsugared cereals Grits, boiled Macaroni Matzo Noodles Pita bread Rice (white and brown) Spaghetti Tortillas (flour or corn)	Biscuits Quick breads Graham crackers Oyster crackers Granola Pancakes Pretzels Saltines Waffles	Ready-to-eat sugared cereals Corn chips Tortilla chips Cheese crackers Snack crackers Croissants Doughnuts Granola bars Fried grits Pastries Sweet rolls

Meat, Poultry, Fish, Eggs, Beans and Nuts

High Nutrient Density	Good Nutrient Density	Lower Nutrient Density
Almonds, beechnuts, Brazil nuts, filberts, pecans, walnuts Beans Well-trimmed, lean cuts of beef, pork, veal and lamb Chicken and turkey without skin, including ground turkey Fish and shellfish (other than fried) Hamburger (made from a lean cut such as the beef round) Peas (split, chick, black-eyed) Pumpkin and sunflower seeds Refried beans made without lard Tofu Tuna canned in water	Eggs Peanut butter Peanuts, pistachios, cashews, macadamia nuts	Bacon Bologna Chitterlings Corned beef Deep-fried chicken Deep-fried fish Frankfurters Hamburger or regular ground beef Refried beans made with lard Salami Sausage Tuna canned in oil

Milk and Milk Products

High Nutrient Density	Good Nutrient Density	Lower Nutrient Density
Buttermilk made from skim or low-fat milk Low-fat cheeses such as ricotta and mozzarella Low-fat cottage cheese Low-fat milk Nonfat milk Nonfat or low-fat dry milk	Cheese made with whole milk "Light" ice cream (7% fat) Ice milk Whole milk Pudding made with nonfat milk Sherbet Frozen yogurt	Cream cheese Heavy cream Whipped cream Half and half Ice cream Chocolate milk Sour cream

Fruits and Vegetables

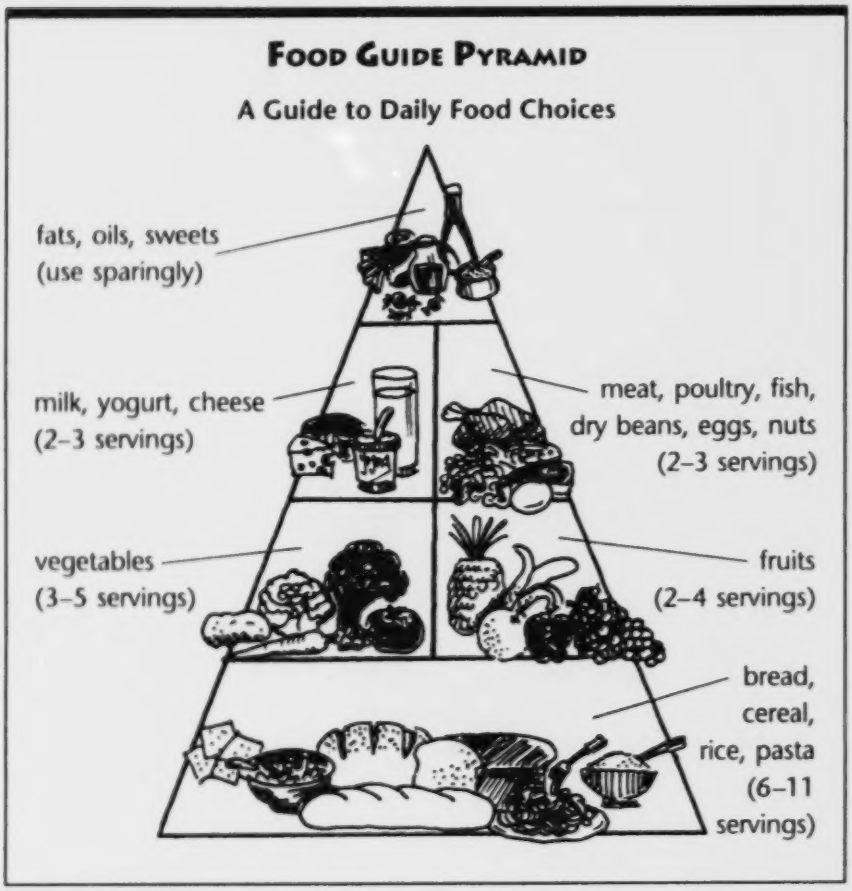
High Nutrient Density	Good Nutrient Density	Lower Nutrient Density
All fresh fruits and vegetables Fruits canned in juice Frozen fruit-juice bars Fruit juices Vegetable juices Canned vegetables Plain frozen vegetables Soups, including cream soups made with nonfat milk	Fruits canned in light syrup	French fries Fruits canned in heavy syrup Frozen fruit-flavored bars Pickles, olives, hash-browns Vegetables frozen with butter or other sauce

Sweets, Fats and Snack Foods

Low Nutrient Density (Use in moderation.)	Low Nutrient Density (Use rarely.)	
Cookies	Butter	Jelly, jam, marmalade
Diet margarine	Candy	Lard
Diet soft drinks	Chocolate	Potato chips
Margarine	Corn chips	Salad dressing made with sour cream or cheese
Mayonnaise	Fruit-flavored drinks	
Salad dressings made with oil	Soft drinks	
Vegetable oils	Gravies	Salt pork
	Ham hocks	Rich sauces
	Honey	Sugar

Food Guide Pyramid

The Food Guide Pyramid system for planning a balanced diet was developed by the U.S. Department of Agriculture. It replaces the "Basic Four Food Guide." The Food Guide Pyramid divides foods into six basic groups, whose location on the pyramid represents the relative quantity to be consumed from each group.



The breads and cereals group at the base of the pyramid is recommended as the largest source of Calories. Fats, oils, sweets and foods containing them are at the top of the pyramid; these foods should be eaten in very small quantities. Several servings of fruits and vegetables should be eaten daily. Meats and dairy products should be consumed in moderation.

Each of these food groups provides some, but not all, of the nutrients needed for health. For the best nutrition, a variety of foods from all the food groups should be eaten daily.

BE SENSITIVE

Educators need to be sensitive to the situations of their students. Cultural, ethnic and economic factors all affect nutrition choices. Students may not be entirely in control of the foods they eat.

Dietary Guidelines

The Dietary Guidelines for Americans are published by the U.S. Department of Agriculture and the U.S. Department of Health and Human Services. These seven recommendations, developed by health and nutrition experts, are designed to help healthy Americans ages two and over answer the question of what to eat to stay healthy.

The exact relationship between diet and long-term health problems is still being studied. However, nutrition authorities agree that many American diets contain too many Calories and too much fat, cholesterol and sodium. They also have too few complex carbohydrates and too little fiber.

These authorities agree that enough is known about effects of nutrition on health to state that such diets contribute to high rates of certain health problems in the United States, including:

- obesity
- heart disease
- high blood pressure (hypertension)
- stroke
- diabetes
- cancer

Disease caused by vitamin and mineral deficiencies is rare in the United States. But many people do not get the recommended amounts of certain nutrients, especially calcium and iron.

Good health depends on heredity, environment and available health care services, as well as diet. Other lifestyle choices are also important to health. But a diet based on the following guidelines can help promote and maintain health.

- Eat a variety of foods.
- Maintain a healthy weight.
- Choose a diet low in fat, saturated fat and cholesterol.
- Choose a diet with plenty of vegetables, fruits and grain products.
- Use sugars only in moderation.
- Use salt and sodium only in moderation.
- If you drink alcoholic beverages, do so in moderation.

The first two guidelines form the framework for the diet. People need to eat a variety of foods to obtain the nutrients the body needs and to maintain healthy weight. The next two guidelines emphasize the need to choose a diet low in fat, especially saturated fat, and high in complex carbohydrates and fiber. The remaining guidelines emphasize the need to avoid consuming too many foods with low nutrient density, such as sweet or salty snacks and alcoholic beverages.

In general, the guidelines emphasize the importance of avoiding extremes in diet. Both eating too much and eating too little can be harmful. These guidelines can help Americans choose diets that are both healthful and enjoyable.

Types of Fat

Some types of fat have more negative effects on health than others. All fats in foods are mixtures of three types of fatty acids:

- saturated
- monounsaturated
- polyunsaturated

■ **Saturated fats** are found in largest amounts in fats from meat and dairy products. They are also found in some vegetable fats such as coconut, palm and palm kernel oils. Eating too much saturated fat raises blood cholesterol levels in many people, increasing the risk for heart disease.

The Dietary Guidelines recommend that saturated fat intake should be limited to less than 10% of Calories. Foods high in saturated fats include nondairy creamers and baked products such as pie crust and other pastries, cakes and cookies.

■ **Monounsaturated fats** are found mainly in olive, peanut and canola oils.

■ **Polyunsaturated fats** are found mainly in safflower, sunflower, corn, soybean and cottonseed oils and some fish.

Reducing Cholesterol

Replacing saturated fats with unsaturated fats, both monounsaturated and polyunsaturated, helps decrease blood cholesterol. Cholesterol is a type of lipid found only in animal products. High levels of blood cholesterol are associated with greater risk for heart disease.

The body, chiefly the liver, makes its own daily supply of cholesterol—about 1,000 milligrams. The average American consumes an additional 400 to 500 milligrams of cholesterol per day in meats, eggs and dairy products. The cholesterol is distributed by the bloodstream in packets called *lipoproteins*. There are two types of these lipoproteins, *low density*, or LDL, and *high density*, or HDL.

- **LDL** carries cholesterol to the cells. LDL that is not used continues to circulate in the bloodstream. Eventually, it accumulates in the arterial walls, decreasing the flow of blood. This condition is called *atherosclerosis*.

  If LDL blocks the coronary arteries, it can cause heart attack; if it blocks arteries in the brain, stroke is the result. That's why LDL is known as "bad" cholesterol.

- **HDL** carries less cholesterol than LDL. As it circulates, HDL has the ability to pick up cholesterol and bring it back to the liver for processing. Because HDL clears the arterial system, it is called "good" cholesterol. It may help protect against coronary artery disease.

Where's the Fat?

- **Red meat:** High in fat, even with visible fat trimmed off. Beef fat is very saturated. Luncheon meats are especially high in fat.
- **Poultry:** Lower in fat and more polyunsaturated fat than red meat. Dark meat is more fatty than white. Removing the skin greatly reduces fat content.
- **Seafood:** Much lower in total fat and more polyunsaturated fat than poultry. Some types are high in cholesterol.
- **Dairy products:** Fat is very saturated. Total fat content can be high or low. Whole milk, hard cheese, cream (sweet or sour) and ice cream are very high in fat; skim milk or products made from it are low in fat. Lower cholesterol content than meat.
- **Eggs:** High in fat and cholesterol, which are in the yolk.
- **Vegetables and grains:** Low in total fat and usually highly unsaturated. No cholesterol.
- **Oils and shortening:** Composed entirely of fat. May be saturated or unsaturated depending on source.

Blood cholesterol levels are measured by taking a small amount of blood for laboratory analysis. The result is a number between 150 and 300 representing the milligrams of total cholesterol in a deciliter (just under a half cup) of blood.

Levels of 180 or lower are considered optimal. Levels above 200 greatly increase the risk of heart disease. Tests can also evaluate the balance of good cholesterol to bad cholesterol.

Vegetarian Diets

The American Dietetic Association has approved vegetarian diets as "healthful and nutritionally adequate when appropriately planned." A vegetarian diet may lower the risk of developing some common serious diseases, including heart disease, stroke and many kinds of cancer.

Types of Vegetarian Diets

- *lacto-ovo-vegetarian*—excludes only meat
- *lacto-vegetarian*—excludes meat and eggs, but allows milk, cheese, yogurt and other dairy products
- *vegan*—excludes meat and all other foods of animal origin

Health Advantages

- lower fat content
- higher fiber content
- abundance of trace minerals
- relatively low levels of pesticides

Planning a Healthy Diet

With planning, adult vegetarians can obtain sufficient protein, vitamins and minerals to meet their nutritional needs. As with all healthy eating, eating a variety of foods increase the likelihood that all nutri-

tional needs will be met. However, vegetarians may need to take particular care to ensure they eat adequate amounts of certain important nutrients. Special care must be taken to ensure that vegan diets for infants and children provide the essential amino acids needed for growth.

- **Vitamin B12 and vitamin D** are found only in animal products, including dairy products and eggs. Vegans may need to take vitamin supplements to get these nutrients. However, with sufficient exposure to the sun, the body can manufacture adequate amounts of vitamin D.
- **Riboflavin**, another B vitamin, is found mostly in animal products, but broccoli and almonds are alternative sources.
- **Minerals** from plant sources may not be absorbed by the body as well as those from animal sources. Vegetarians, especially vegan women, need to be sure they are getting enough calcium, iron and zinc. Good sources of these minerals include:
  - — calcium: green vegetables, fortified tofu
  - — iron: beans, potatoes, breads, fortified cereals
  - — zinc: peas, lentils, wheat germ
- **Protein** from from plants is incomplete, because, unlike protein from meat or fish, it lacks sufficient amounts of one or more essential amino acids. Plant proteins must be combined to form a complete protein.

  Combining foods from two or more of the following groups provides a complete protein:
  - — grains: barley, bulgur, cornmeal, oats, rice, whole-grain breads, pasta
  - — legumes: dried beans, dried lentils, dried peas, peanuts, soy products (e.g., tofu)
  - — seeds and nuts: sesame seeds, sunflower seeds, walnuts, cashews, other nuts, nut butters
  - — vegetables: leafy greens, broccoli, carrots, Brussels sprouts, beets

Recommended Daily Allowances (RDAs) and Daily Values

In 1973, the term *U.S. RDA*, or Recommended Daily Allowance, was introduced by the Food and Drug Administration (FDA) as a label reference for vitamins, minerals and protein in voluntary nutrition labeling. The values of these RDAs were based on the recommendations determined by the National Academy of Sciences, which were *also* called RDAs, or Recommended *Dietary* Allowances.

Confusion between these two terms led to the introduction of a new term, *Reference Daily Intake (RDI)*, when new food labels were developed as authorized by the Nutrition Labeling and Education Act of 1990. New values for the RDIs were to be established for labeling purposes after December 1993.

The change in nutrition labeling led to a new label reference value—the Daily Value. This value comprises two new sets of dietary standards—Daily Reference Values (DRVs) and RDIs. However, only the Daily Value term appears on the new labels.

DRVs apply to the nutrients that are sources of energy, including fat, carbohydrate (including fiber) and protein, and to cholesterol, sodium and potassium, which do not contribute Calories. For the energy-producing nutrients, DRVs are based on the number of Calories consumed per day, with a daily intake of 2,000 Calories used as the reference. For other nutrients, they are based on an upper intake limit that is considered desirable.

The Daily Value is a percentage that can help consumers evaluate the nutritive content of a food within the context of what is considered a healthy standard. For example, a food with 140 milligrams of sodium contains less than 6% of the Daily Value for sodium, which is 2,400 milligrams; on the other hand, a food with 5 grams of saturated fat would provide 25% of the 20-gram Daily Value for saturated fat.

Food Labeling

New regulations for food labels, developed after the passage of the Nutrition Labeling and Education Act, increased the usefulness of food labels in helping consumers evaluate their nutritional intake. These regulations, developed by the FDA and the U.S. Department of Agriculture's Food Safety and Inspection Service, determined the format of food labels, what products must carry them and the information they must contain.

Label Content

Under the title *Nutrition Facts* are the dietary components a food product contains. The mandatory **(boldface)** and voluntary components, and the order in which they must appear, are as follows:

- **total calories**
- **Calories from fat**
- Calories from saturated fat
- **total fat**
- **saturated fat**
- polyunsaturated fat
- monounsaturated fat
- **cholesterol**
- **sodium**
- potassium
- **total carbohydrate**
- **dietary fiber**
- soluble fiber
- insoluble fiber
- **sugars**
- sugar alcohol (for example, the sugar substitutes xylitol, mannitol and sorbitol)
- other carbohydrate (the difference between total carbohydrate and the sum of dietary fiber, sugars and sugar alcohol if declared)
- **protein**

- **vitamin A**
- **vitamin C**
- **calcium**
- **iron**
- other essential vitamins and minerals

If a claim is made about any of the optional components, or if a food is fortified or enriched with any of them, nutrition information for these components then becomes mandatory.

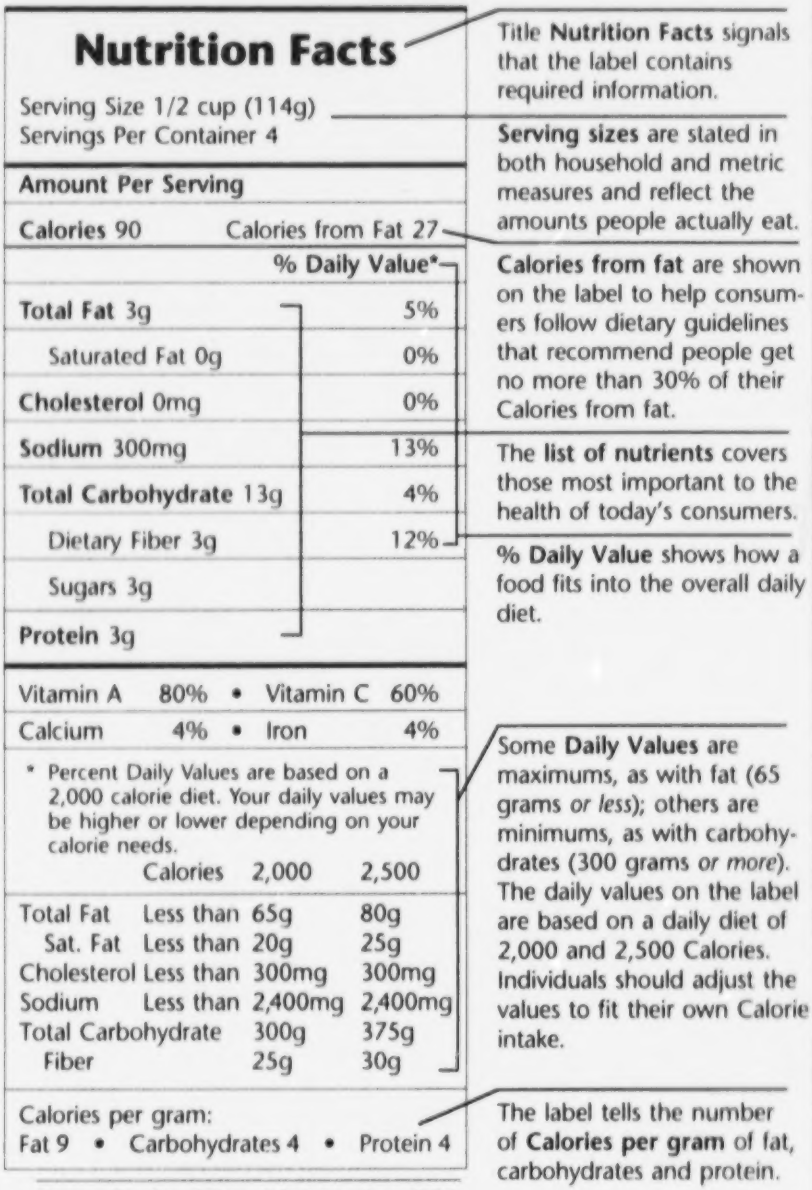
Following each nutrient listed on the label are two numbers. The first represents the amount, in grams, of the nutrient; for example, 2 grams of protein. The second number is the percentage of the Daily Value of that nutrient.

■ **Serving sizes:** For many years after food labeling was first introduced, serving size was determined by the manufacturer. The stated serving size, on which the reported nutrition information was based, was often far different from the actual serving size people consumed.

The new labels have more uniform serving sizes based on the FDA-established "Reference Amounts Customarily Consumed Per Eating Occasion" list. The serving sizes are expressed in both common household and metric measurements.

For example: Under the category "bakery products," cookies have a reference amount of 30 grams. The household measure closest to that amount is the number of cookies that comes closest to weighing that amount. Thus the serving size on the label of a package of cookies in which each cookie weighs 13 grams would read: "2 cookies (26 grams)."

Sample Food Label



Nutrition Facts

Serving Size 1/2 cup (114g)
Servings Per Container 4

Amount Per Serving

Calories 90 — Calories from Fat 27

	% Daily Value*
Total Fat 3g	5%
Saturated Fat 0g	0%
Cholesterol 0mg	0%
Sodium 300mg	13%
Total Carbohydrate 13g	4%
Dietary Fiber 3g	12%
Sugars 3g	
Protein 3g	

Vitamin A 80% • Vitamin C 60%
Calcium 4% • Iron 4%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat. Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrates 4 • Protein 4

Source: Food and Drug Administration, 1992.

Title **Nutrition Facts** signals that the label contains required information.

Serving sizes are stated in both household and metric measures and reflect the amounts people actually eat.

Calories from fat are shown on the label to help consumers follow dietary guidelines that recommend people get no more than 30% of their Calories from fat.

The **list of nutrients** covers those most important to the health of today's consumers.

% Daily Value shows how a food fits into the overall daily diet.

Some **Daily Values** are maximums, as with fat (65 grams *or less*); others are minimums, as with carbohydrates (300 grams *or more*). The daily values on the label are based on a daily diet of 2,000 and 2,500 Calories. Individuals should adjust the values to fit their own Calorie intake.

The label tells the number of **Calories per gram** of fat, carbohydrates and protein.

Label Glossary: Nutrient Content Descriptors

- **Free:** Means that a product contains no amount of, or only a "physiologically inconsequential" amount of, one or more of these components: fat, saturated fat, cholesterol, sodium, sugars and Calories.
- **Low:** Used on foods that can be eaten frequently without exceeding dietary guidelines for one or more of these components: fat, saturated fat, cholesterol, sodium and Calories.
- **Lean and extra lean:** Used to describe the fat content of meat, poultry, seafood and game meats. Lean means less than 10 grams of fat, 4 grams saturated fat and 95 mg of cholesterol per 100-gram serving. Extra lean means less than 5 grams of fat, 2 grams saturated fat and 95 mg of cholesterol per 100-gram serving.
- **High:** Used if the food contains 20% or more of the Daily Value for a particular nutrient per serving.
- **Good source:** Means that one serving contains 10% to 19% of the Daily Value for a particular nutrient.
- **Reduced:** Means a nutritionally altered product has 25% less of a nutrient or Calories than the regular or reference product. A reduced claim cannot be made on a product if its reference food already meets the requirement for a low claim.
- **Less:** Means that a food, whether altered or not, contains 25% less of a nutrient or Calories than the reference food.
- **Light:** Means first, that a nutritionally altered product contains one-third fewer Calories or half the fat of the reference food. If it derives 50% or more of its Calories from fat, the reduction must be 50% of the fat. Second, means the sodium content of a low-Calorie, low-fat food has been reduced by 50%. "Light in sodium" may be used on food if the sodium content has been reduced by at least 50%.
- **More:** Means that a serving of food, whether altered or not, contains a nutrient that is at least 10% of the Daily Value more than the reference food.
- **Fresh:** Can be used only on food that is raw and has never been frozen or heated and contains no preservatives.

- **Ingredients:** All foods that have more than one ingredient must list them all in descending order based on weight. For example, if a cereal package lists its ingredients as sugar, corn, salt and chocolate flavoring, then the cereal contains more sugar than any other ingredient.

  The new ingredient list must also include, when appropriate, certain additives to which some people may be allergic. In addition, beverages that contain fruit juice must state the percentage of volume that is fruit juice.

1-Minute Facts

- Foods can be grouped in categories according to which nutrients they have in common.
- The Food Guide Pyramid system divides foods into six basic groups, whose location on the pyramid represents the relative quantity to be consumed from each group.
- The Dietary Guidelines for Americans are designed to help healthy Americans determine what to eat to stay healthy.
- Replacing saturated fats with unsaturated fats helps decrease blood cholesterol. High levels of cholesterol are associated with heart disease.
- Blood tests can evaluate the balance of "good" cholesterol (HDL) to "bad" cholesterol (LDL).
- The Daily Value of a food is a reference that appears on new food labels. This percentage can help consumers evaluate the nutritive content of a food.
- New food labels developed in the 1990s help consumers evaluate nutritional intake.

NUTRITION AND HEALTH

MYTH: Iron is found in many foods, so most people get all they need.

Fact: Although iron is found in many foods, it is often in a form that is not easily absorbed by the body. The diets of many toddlers, teenagers and women do not contain the recommended amount of iron.

Many health problems, including four of the top five leading causes of death in the United States, are related to lifestyle. Good nutrition is one important aspect of a healthy lifestyle. A variety of health problems or conditions can be linked to nutrition, including:

- heart disease
- cancer
- stroke
- diabetes mellitus
- atherosclerosis

The Effects of Vitamins and Minerals

Too high or too low an intake of many vitamins and minerals can contribute to disease or other health problems. If the body doesn't receive an adequate supply of a particular vitamin or mineral, a specific health problem will occur. A balanced diet provides adequate amounts of vitamins and minerals, and nutritional supplements usually are not required. However, in some special conditions, such as pregnancy or illness, supplements may be necessary. Overdoses of vitamins and minerals can also contribute to disease.

Factors that affect the intake of vitamins and minerals include:

- **Restricted diets:** Eating only a few different kinds of food can cause problems, especially if the foods have been altered by refining or processing. Most of the classic vitamin deficiency diseases, such as *scurvy* or *beriberi*, result from lack of dietary variety and overprocessing. These diseases are rare today in the United States because staple foods are often vitamin enriched; however, marginal deficiencies still exist.

- **Loss of vitamins from foods:** These deficiencies are caused not only by refining methods, but also through food handling by consumers. Vitamins are lost by improper storage, mashing or peeling, cooking in water, adding baking soda or cooking at high temperatures.

- **Failure of digestive absorption:** Sometimes people who get plenty of nutrients from varied dietary sources still have nutrient deficiencies because the body isn't able to absorb the nutrients from the intestines into the bloodstream. Malabsorption doesn't usually affect healthy people, but it can be a complication of aging and various diseases of the digestive tract.

- **Increased need:** Many common situations increase a person's need for vitamins or minerals. Menstruation, preg-

nancy, recovery from surgery or trauma, cancer, use of oral contraceptives, smoking and alcohol use can deplete vitamins or minerals even with normal intake levels.

Minerals

Some of the minerals most commonly linked to disease include:

- sodium
- potassium
- iodine
- iron

■ **Sodium** is the mineral in salt that contributes to high blood pressure, or *hypertension*. Excess sodium intake can cause sodium-sensitive people to develop chronic, dangerous high blood pressure.

Sodium is found in table salt and soy sauce. Other products may also have a high sodium content. Baked goods, canned, processed and frozen foods are all hidden sources of sodium.

Bacon, sausage, ham, cold cuts and most bottled salad dressings are high in sodium nitrate. Other "hidden" sodium sources are quick-cooking cereals and processed cheese—which are high in disodium phosphate.

Ice cream and chocolate milk often contain disodium alginate, which gives them a smooth texture. Sodium hydroxide is used to soften the skins of olives and other vegetables.

Another form of salt—sodium propionate—is used in breads, cakes and some cheeses to inhibit mold. Dried fruits are often high in sodium sulfate. Monosodium glutamate (MSG) is used as a flavor enhancer in many foods, including snack items.

All these forms of sodium should be avoided by people who limit sodium intake for health reasons. The Dietary Guidelines for Americans recommend that all Americans reduce sodium intake.

- **Potassium** is one of the most abundant minerals in the human body. Evidence suggests that potassium may be just as important as sodium in relation to hypertension. However, while sodium intake raises blood pressure, diets rich in potassium keep it down.

  Natural food sources of potassium include fruits, legumes, vegetables, wheat germ, unsalted peanuts, squash, nuts and orange juice. Although bananas have a reputation as a good potassium source, peaches, lima beans, baked potatoes, spinach and other fruits and vegetables have more potassium.

- **Iodine** is present in the body in extremely small amounts, but it is essential for health. Iodine is necessary for the synthesis of the hormone produced in the thyroid gland, which regulates the body's metabolic activity.

  When iodine is deficient, the cells of the thyroid gland grow to try to trap as many iodine particles as possible. The gland becomes enlarged, swollen and congested—a condition known as *goiter*. People with goiter become sluggish and gain weight. Although few people in the United States today develop goiters, an estimated 200 million cases still occur worldwide each year, mostly caused by lack of iodine.

  Low iodine intake during pregnancy causes extreme, irreversible mental and physical retardation of the infant known as *cretinism*.

  Seafoods and seaweeds are the best natural sources of iodine. However, sea salt is not a good source of iodine because the mineral escapes as a gas during the drying process. Vegetables reflect the iodine content of the soil in which they were grown.

  Since the 1920s, table salt has been fortified with sodium iodide, a form of iodine that is readily absorbed and used by the thyroid gland. In the United States, about half of commercially available salts are iodized; labels must clearly state if iodine is included.

■ **Iron** is the best known of all the essential minerals. It is also the nutrient most commonly deficient in human diets around the world.

Unlike other minerals, the body never deliberately excretes iron. An adult's body contains three to five grams of iron. About one gram is stored in the liver. When red blood cells are broken down at the end of their life cycle, their iron is salvaged and recycled. However, iron losses still occur.

The mineral is present in every cell, so cells lost though flaking skin, hair growth, sweat, urine and feces deplete iron stores. Bleeding—from cuts, ulcers, excessive use of aspirin or alcohol, or cancer—or blood donation can also cause significant iron loss.

In women, the monthly menstrual period accounts for an iron loss of about 20 milligrams in addition to the 15 to 30 milligrams from tissue sloughing. In general, women lose nearly twice as much iron as men.

Growing children need more iron than adults because they are increasing their blood volume and muscle mass.

Since iron is necessary to all cells, and all cells depend on oxygen, iron deficiency can have many effects. *Anemia* results when the levels of circulating hemoglobin are low. The red blood cells become pale and cannot deliver needed oxygen to the cells.

People who are anemic look pale, feel weak, are easily fatigued, can't concentrate, get headaches and can experience a range of other symptoms. Anemia can cause peculiar food cravings, especially for ice. The disease also reduces the ability of the immune system to fight bacteria.

Natural sources of iron include liver, heart, kidney, lean meats, shellfish, dried beans, fruits, nuts, green leafy vegetables, whole grains and blackstrap molasses. However, many factors can influence how iron in food is absorbed. Tea, coffee, soy protein, wheat bran, calcium supplements and fiber can impair iron absorption. Even without these influences, a normal, healthy person absorbs only about 10% of the iron available in a mixed diet.

Vitamins

There are two different types of vitamins—fat-soluble and water-soluble.

- **Fat-soluble vitamins** usually occur together in the fats and oils of foods. These vitamins—A, D, E and K—require bile from the liver for absorption.

  Once absorbed, fat-soluble vitamins are not easily excreted; they remain stored in the liver and fatty tissues until the body needs them. Because they can be stockpiled for future use, they do not need to be consumed daily to prevent deficiency. A diet that supplies the average amount of these vitamins overall is adequate.

  However, toxicity can be a problem because the body stores fat-soluble vitamins. Eating too many foods that contain them can cause an excess. This situation is more likely in people who take supplements of these vitamins. Because many Americans eat too many fatty foods, dietary deficiencies of these vitamins are relatively uncommon.

Fat-Soluble Vitamins

Vitamins A, D, E and K are fat-soluble. They have the following properties:

- Soluble in fat.
- Dietary excess is stored for future use.
- Not excreted by the body.
- Deficiency symptoms develop slowly.
- Not absolutely necessary in diet every day.
- Absorbed into lymphatic system.
- Toxic in excess.
- Less easily destroyed by cooking or storage than water-soluble vitamins.

■ **Water-soluble vitamins** must be supplied by the diet daily, because most of them cannot be stored by the body. Any excess of these vitamins is excreted in the urine. These vitamins include the eight B-complex vitamins and vitamin C.

A deficiency of the B vitamins often causes fatigue. *Pernicious anemia* is a result of the failure to absorb vitamin B12. Bread and cereal products are often enriched with certain B vitamins. This practice has greatly reduced the incidence of disease due to lack of B vitamins. A diet that includes a wide variety of foods helps supply B vitamins.

A deficiency of vitamin C, also called *ascorbic acid*, causes *scurvy*. Citrus fruits, cabbage-type vegetables, dark green vegetables, cantaloupe, strawberries, peppers, lettuce, tomatoes, potatoes, papayas and mangoes are good sources of vitamin C.

Water-Soluble Vitamins

Vitamins C, B6, B12, thiamin, riboflavin, niacin, folate, pantothenic acid and biotin are water-soluble vitamins. They have the following properties:

- Soluble in water.
- Minimal storage of dietary excess.
- Excreted in urine.
- Deficiency symptoms develop rapidly.
- Must be supplied in diet every day.
- Absorbed into blood.
- Some (vitamin C, niacin and B6) are toxic in excess.
- Very easily destroyed by cooking or storage.

The Scourge of the Navy

Scurvy became prevalent in the eighteenth century when shipbuilding technology produced boats that could sail for months without returning to port. The sailors' diet on these long voyages lacked fresh fruits and vegetables, which sometimes caused as many as two-thirds of the sailors to die from scurvy.

In 1747, a Scottish physician guessed that scurvy might be cured by some "acidic principle." He tested his theory by treating 12 sick sailors with six different treatments. The two sailors who were given two oranges and one lemon each day were completely cured within a week.

The British Navy finally instituted anti-scurvy measures in 1795. All ships leaving British ports were required to carry enough lemon juice to supply the crew for the duration of the trip. Because the British called lemons *limes*, British sailors came to be known as "limeys," a nickname for the British that still persists.

The Effects of Other Nutrients

Other nutrients are implicated in both common and unusual health problems.

- Health problems such as diabetes mellitus, hypoglycemia and lactose intolerance can be affected by the consumption of **carbohydrates**. Some of these problems are related to the body's inability to metabolize certain sugars or failure to produce certain hormones, such as insulin.

  The consumption of simple carbohydrates is related to dental decay. Bacteria in the mouth neutralize the carbohydrate and produce acid, which destroys tooth enamel.

- The consumption of **lipids** (fats) is related to atherosclerosis, which can lead to cardiovascular disease and stroke. A high-fat diet may also increase the risk for certain cancers.

- The diseases of **protein deficiency** are commonly referred to as *protein-Calorie malnutrition*. Most people living in the United States or other developed countries never have to worry about protein or Calorie deficiency.

  But around the world, this problem causes a massive death toll, particularly among children under five, whose protein needs are greater than those of adults. More than 15 million children starve to death every year, and the United Nations estimates that half of all children in developing countries are inadequately nourished. These children starve due to lack of total Calories as well as insufficient intake of high-quality protein.

  People living in developed countries, however, tend to consume protein in excess. Excess protein may be a contributing factor in osteoporosis, cancer, obesity and atherosclerosis.

1-Minute Facts

- Good nutrition is an important aspect of a healthy lifestyle.

- Too high or too low an intake of many vitamins and minerals can contribute to disease or other health problems.

- Fat-soluble vitamins can be toxic when taken in excess.

- Water-soluble vitamins must be supplied by the diet daily.

- Other nutrients can also be related to health problems, including cardiovascular disease and cancer.

Body Image and Weight Control

Myth: The best way to lose weight is to eat a diet very low in Calories.

Fact: Extremely low-Calorie diets may lead to quick weight loss, but they can be dangerous, and in most cases the lost weight is regained. The best way to lose weight is to eat a healthy, balanced diet and get regular exercise.

The United States is a nation of obsessive weight watchers. Surveys show that many Americans think they weigh too much. An estimated 50 million American men and women are on some kind of diet to lose weight at any given time. At least 25% of these dieters are not overweight. In fact, only about a quarter of all American adults are overweight at all. Overweight is not a health problem unless someone is *overfat.* The term *obese* is often used to describe people whose body fat levels are unhealthy.

Many preteen children are already obsessed with their weight. Studies have shown that many boys and girls would

like to be thinner and have tried to lose weight by exercising or restricting Calories.

Teenage girls are also very concerned about their weight. About one-half think they are too fat when, in fact, most of them are within the normal weight range for their height.

However, studies indicate that obesity in adolescents has increased during the past two decades. This trend appears to be continuing, despite today's emphasis on fitness and healthy eating habits. Today's youth are not as physically active as youth in earlier decades.

Weight loss programs for adolescents need to deal with both the emotional and physical components of the problem. Programs should emphasize well-balanced nutrition, physical activity, and psychological and family support, and should provide long-term, follow-up care.

Body Image

Body image develops based on interactions with people and the world around us. It begins during infancy as babies begin to sense that their bodies are separate from their mothers' and different from the objects around themselves.

As children grow, they experience their bodies by using them. Running, climbing, tumbling and other forms of physical exertion provide pleasure.

At some point, children become aware of the social factors that influence body image. One of the most powerful is media advertising, much of which relentlessly sells the "perfect" body. As people hear these messages over and over, they may come to expect their bodies to conform to these images.

This idealized image ignores the reality that people come in a wide variety of shapes and sizes and fails to recognize that diversity is a positive characteristic of human beings. Media messages perpetuate a society that ostracizes and stigmatizes people who deviate too greatly from the perceived ideal.

Influences on Body Size

A variety of factors influence body size. Some of these factors are under the individual's control, others are genetically determined and hard to change.

- **Heredity** is the major factor in an individual's weight and pattern of weight gain. Adult body size is a genetic trait that can influence other factors in determining the normal weight range. There is a tremendous amount of variation in body size. To some extent, people are programmed to be fat, thin or in-between.

- **Exercise** is another important factor in weight control. Fat cells store unused energy, so people who lead sedentary lives tend to be overfat, or obese, even when their Calorie consumption is not excessive. One study, for example, showed obesity rates were higher in teens who watched more TV. In general, Americans have decreased their level of physical activity by 75% since 1900.

Economic status and cultural background can also influence weight. Low-income people may make nutritional choices based on the types of foods they can afford to buy. They may be less educated about food choices. They may choose to eat foods that are higher in fat and Calories because such foods are cheaper and more filling. Cultural traditions may affect how foods are prepared. In some cultures, fat bodies are viewed as healthy and a sign of success.

Weight and Health

Traditionally, appropriate weight was determined by using "ideal weight" tables. People who weighed 20% more than the ideal weight were considered obese; people who weighed 10% less were underweight. However, weight varies for many reasons, including:

- **Frame size:** Differences in skeletal size are largely controlled by hereditary factors.
- **Gender:** Females naturally have more fat than males.
- **Age:** People tend to add body fat as they age.
- **Body composition:** The proportion of muscle and fat affects weight. Muscle weighs more than fat.

People who have more muscle than fat tissue may appear to be overweight according to most tables. Weight alone does not give information about body composition.

Nutritionists today use a more comprehensive measure called the *Body Mass Index* or BMI. BMI incorporates both height and weight to assess level of fatness for adults. The body fat to lean tissue ratio can also be measured in other ways, including skin-fold tests, which may be more appropriate measures for adolescents.

Finding Your BMI

Calculating Body Mass Index is easy. Multiply your weight by 700, divide by your height in inches, then divide by height again. For example:

160 lbs. x 700 = 112,000

112,000/66 in. = 1697

1697/66 in. = 25.7 BMI

Scientists consider a BMI of 25 or less to be desirable for most adults. A BMI of 25–30 indicates mild or moderate overweight and carries a slightly increased risk of weight-related health problems. A BMI over 30 is considered truly overweight, with a greatly increased risk of health problems.

Being either too thin or too fat presents health risks. Thin people will always die first if food becomes scarce, as during famine or war. Very thin people have a harder time fighting wasting diseases such as cancer or HIV infection. Overly thin people have little energy or nutrient reserves that might help them withstand potential threats to health.

Excess body fat can be unhealthy, too. Scientists know that rates of hypertension are greater among over-fat people, as are the resulting stroke rates. Excess fat also demands extra capillaries to keep the tissue supplied with nutrients, which may increase the load on the heart muscle to the point of damaging it.

Weight gain can lead to the development of diabetes in susceptible individuals. People whose families have a history of diabetes or hypertension should work with a doctor to manage their weight.

Current research indicates that the real health danger may not lie in being moderately overweight at all, but in the "yo-yo" effect of weight loss followed by weight gain that so frequently occurs in dieting. A healthy lifestyle, which includes a low-fat diet and exercise, is the best way to preserve health and moderate weight.

Fat Cells

The average adult has about 30 to 40 billion fat cells. Fat cells begin forming before birth and continue to accumulate during the first six months of infancy. The rate slows in childhood but accelerates again at puberty, especially for females, whose bodies prepare for the possible demands of pregnancy and lactation.

By early adulthood, people have most of the fat cells they will ever have. When individuals gain weight, these cells increase in size. Losing weight causes the fat cells to shrink but not to disappear.

Energy Requirements

Energy enters the body in the form of food. When the amount of energy consumed is more than the amount used, the excess is stored as fat. It takes about 3,500 excess Calories to create one pound of fat.

The Calorie content of foods has been determined in laboratory tests. Many prepared foods are required to list the number of Calories on the label. Nutritionists have devised charts that list the energy value for most foods.

However, determining how much energy an individual needs is difficult. People vary in their energy needs. There are two major forms of work the body does that require energy: *basal metabolism* and *physical activity.*

- **Basal metabolism** is the energy required just to keep the body going—heartbeat, breathing, keeping body temperature stable, sending nerve impulses, etc. Researchers estimate it takes 1200 to 1400 Calories per day to maintain these activities, although there is considerable variation in individual metabolism.

- Energy can be expended in **physical activity** or exercise. Studies show that exercise that increases muscle mass also increases the resting metabolism rate. Moderate exercise seems to have the greatest health and weight control benefits.

Weight Maintenance

The percentage of dietary fat is a major predictor of weight gain or loss. A low-fat diet, even one that is relatively high in Calories, is better able to satisfy hunger and keep pounds from accumulating. Studies have indicated that when the

average American diet, which derives about 37% of Calories from fat, is reduced to a level of only 20% fat, people lose weight even with increased caloric intake.

It can be as difficult for people who are underweight to gain as it is for people who are overweight to lose. Physical activity is a critical component of weight gain as well as weight loss. The best activities for weight gain are activities such as weight-lifting and calisthenics, which build strength because they build muscle bulk. Weight gain that is mostly fat may be more unhealthy than staying underweight.

Calorie intake must be adjusted to meet the demands of the increased physical activity. Food selection is important, and eating more frequently will help promote weight gain. To promote weight gain, foods should not only have high nutrient value but also be Calorie-dense. Many such foods are high in fat. If these foods are contributing to energy expenditure, however, they will not be harmful but will help build a stronger body.

The Problem with Crash Diets

People who try crash diets that are very low-Calorie often lose weight, but they usually gain it all back and more. Low-Calorie diets alone don't work for the following reasons:

- When food is restricted, the body acts to prevent starvation. The body lowers its metabolic rate and resists burning fat. When the desired weight is lost and the dieter begins eating normally, the body treats the increase as excess food, and weight gain occurs.
- The initial weight lost quickly is mostly water, not fat.
- Overall percentage of body fat may actually increase on a very low-Calorie diet.

A healthy lifestyle is the most important factor in maintaining a healthy weight. The following guidelines contribute to a healthy lifestyle and healthy weight.

- Eat a variety of foods that are low in fat and high in other nutrients, such as fruits, vegetables and whole grains.
- Maintain an exercise program. Exercise builds lean body tissues, burns fat and may reduce appetite, although some weight gain may occur from the increased muscles.
- Develop hobbies that can take the place of eating.
- Avoid temptation.
- Set goals, and be willing to start again after a lapse.

Check Out Those Diet Claims

Diets are big business in America. Dieters spend nearly $33 billion a year on weight-loss products, books, programs and videos. Wall Street analysts predict the market will grow even bigger.

Consumers should beware of any weight-loss promotion that

- promises substantial, rapid weight loss
- promotes extremely low-Calorie intake without careful supervision by a doctor
- requires purchase of special products such as low-Calorie convenience foods
- fails to encourage exercise as part of lifelong weight management
- requires clients to spend large sums of money to start a program or requires a long-term contract
- does not inform clients about the health risks associated with weight loss
- uses unproven or possibly harmful dietary aids such as injections of human chorionic gonadatropin hormone (HCG), diuretics, body wraps, etc.

Eating Disorders

Most adolescents are preoccupied with the physical changes occurring in their bodies. They are also developing mental and emotional coping mechanisms to deal with those changes. Adolescents are at a crucial point in their lives, when they must establish rational goals based upon knowledge obtained from their education.

Some dieting behavior among adolescents may be considered within the range of normal. However, obsession with weight control and the pursuit of thinness may indicate eating disorders.

Generally, eating disorders are caused by emotional problems, including low self-esteem. Individuals with eating disorders engage in extreme behaviors that often require professional help.

A program that teaches the basics of nutrition and establishes guidelines for appropriate levels of weight, encourages exercise and provides the information necessary to distinguish between healthy and harmful reducing methods can be effective in overcoming the development of eating disorders. Information about self-esteem and body size may also be helpful.

Approximately two million people, primarily girls and women from middle-class or upper-class families, suffer from an extreme fear of fatness that results in a disease called *anorexia nervosa* or its relative, *bulimia*.

- **Anorexia nervosa:** Although females are more likely than males to suffer from anorexia nervosa, males have been diagnosed with it as well. It is classified as a psychological disorder.

  Many anorectics have a history of depression and perfectionism. Family problems (e.g., substance abuse) are common. Family members are likely to value outward appearance

and undervalue self-esteem. Anorexia victims feel that they have very little control over their lives or world conditions. Food intake, however, is something they can totally control.

Anorexia nervosa may have a sociological basis as well. The detection of the disease has increased in the past 25 to 30 years, which coincides with social changes that increasingly link beauty to thinness. Some people, particularly young women, may feel unhappy and think they are unattractive because they are not thin enough.

Anorexia nervosa is a serious illness. Only about half of those who are treated for anorexia nervosa recover fully, and 6% to 15% of all anorexia nervosa sufferers die, which makes anorexia one of the deadliest of all psychiatric disorders. Sudden deaths among anorectics are often due to the serious damage that anorexia causes to the heart. The disorder can be an identifiable risk factor associated with teenage suicide.

Although there is no known way to prevent anorexia nervosa, early detection and treatment can avoid most of the harmful effects of this disease. Friends, relatives, teachers or others who suspect a person has this disorder should strongly advise the individual to seek professional help.

- **Bulimia** is more common than anorexia nervosa. This eating disorder is similar to anorexia in that most victims are young, middle-class or upper-class females who are obsessed with being thin. Girls with the condition outnumber boys by a two to one margin.

  Bulimia involves bingeing and purging. Bulimics eat huge amounts of food at one time, usually after a period of severe Calorie restriction, then purge. Purging can take one of three forms—vomiting, which is the most frequently reported, the use of laxatives or the use of water pills or diuretics.

The behavior is found in people, many of them teenagers, who are preoccupied with their weight. They are often "Calorie counters" who diet frequently and suffer pangs of guilt when they think they have overeaten. Bulimics commonly consume more than 5,000 Calories at one time, often in the form of nutritionally poor foods such as ice cream or potato chips.

The condition is caused by the same kinds of factors that lead to anorexia nervosa. Bulimics tend to set excessively high standards for themselves. They have low self-esteem and are very sensitive to the societal emphasis on being thin.

Bulimia can be harder to spot than anorexia nervosa. Bulimics do not necessarily lose a great deal of weight, and the bingeing and purging is done in secret. However, bulimia can be easier to treat than anorexia nervosa because bulimics recognize that their behavior is abnormal. A combination of medical care and psychological counseling can help break the bingeing-and-purging cycle.

Bingeing and purging can have serious health consequences. Although there is no known way to prevent bulimia, early detection and treatment can avoid most of the harmful effects of this disease.

1-Minute Facts

- The United States is a culture of obsessive weight watchers.
- A variety of social factors influence body image.
- A variety of factors influence body size, and some of them are not under individual control.
- Individual weight varies for many reasons, including frame size and body composition.
- Being either too thin or too fat presents health risks.
- A healthy lifestyle is the most important factor in maintaining a healthy weight.
- The most serious eating disorders affecting teenagers and adults are anorexia nervosa and bulimia.

Nutrition and Exercise

Myth: Athletes require more protein in their diets than other people.

Fact: Physical exertion increases the body's need for energy, but not necessarily for protein. Foods that provide nutrients in the form of complex carbohydrates are more effective in meeting the energy demands of athletics.

Everyone who exercises needs to eat enough food to maintain a reasonable, healthy body weight. Women athletes in particular should note that standard height and weight tables are not accurate for them. Athletes weigh more because they have proportionately more muscle and bone.

Energy Sources

During exercise, the body adjusts its metabolism to release adequate amounts of energy to feed the muscles. How the muscles use the body's stored fuels depends on the duration and intensity of the exercise and how well the exerciser is conditioned.

- **Glycogen:** The liver and muscles store glucose in the form of glycogen. During exercise, the glycogen stored in the liver is broken down into glucose, which is released into the bloodstream. The muscles use the blood glucose in addition to that supplied by their own glycogen stores.

  However, the human body cannot store as much glycogen as it can fat. The amount of glycogen available depends on how well the muscles have adapted to greater energy needs by increasing storage capacity and how much carbohydrate is consumed in the diet.

  A high-carbohydrate diet enhances athletic endurance by ensuring adequate glycogen stores. Many studies have looked at diet and its relationship to performance. For example, when runners eat high-carbohydrate diets, they can perform significantly longer than competitors who eat either a normal balanced diet or high-fat and high-protein diets.

  The intensity of the exercise affects the use of glycogen. Sprinting and other forms of high-intensity exercise use glycogen very quickly. Jogging and walking, on the other hand, deplete stores more slowly. On average, vigorous exercise will use up glycogen stores in less than two hours.

  How long exercise continues also affects fuel use. About one-fifth of the available glycogen is used during the first twenty minutes of moderate exercise. As exercise continues, the muscles begin to use less and less glycogen and more and more fat for fuel.

Endurance athletes need to maintain their blood glucose levels as long as they can by:

- eating a high-carbohydrate diet
- taking in glucose during the event
- training the muscles to store as much glycogen as possible

Will Drinking Glucose During Exercise Help You Perform?

Endurance athletes sometimes drink a sugary beverage during an event to forestall glucose depletion. Studies show that the glucose slowly finds its way to the muscles, which prevents total exhaustion at the end of the contest.

However, these drinks are effective only during endurance exercise—high-intensity exercise that lasts more than one and a half hours. Sugar, or glucose, may actually hurt nonendurance performance.

When glucose is taken within the three hours before exercise, it will stimulate insulin production, causing blood glucose to decline. Experiments with runners show that sugar drinks taken just before exercise can reduce athletic performance by 25%.

- **Fat:** In general, the longer the duration of exercise, the more energy fat contributes. Even after physical activity stops, fat use continues for hours. Studies show that fat continues to be burned for several hours after the exercise ends. The studies indicate that people who exercise regularly burn more fat all day long, not just during exercise.

- **Protein:** Protein is not a major source of energy. Athletes' need for protein may be slightly higher than nonathletes', but these needs are adequately met by a normal diet. Even endurance athletes get enough protein to meet demand because they consume more total food. Protein supplements do not enhance athletic performance.

Vitamins and Minerals

Although people who exercise need adequate amounts of vitamins to be healthy, they usually don't need vitamin supplements. However, women and teenagers may need iron supplements.

- **Vitamins:** There is no evidence that vitamin supplements increase physical performance. Excesses of some vitamins may have an adverse effect on performance. Taking vitamins just before an activity doesn't enhance performance. A healthy diet, including leafy green vegetables, meats, fish, legumes, fruits and whole grains, meets the vitamin needs of athletes.

- **Iron:** Endurance athletes, especially if they are women, are prone to iron deficiency for the following reasons:
  - Iron may be lost in sweat.
  - Red blood cells may be destroyed when tissues are injured when they make high-impact contact with hard surfaces.
  - Reduced iron absorption in the digestive tract.
  - Increased need for iron to make a muscle protein.

Vegetarian women are at higher risk for iron deficiency, but the problem can be severe even among women who do eat meat. Low intake combined with high losses through menstruation and training can cause iron-deficiency anemia in athletes such as runners and gymnasts.

The best strategy is to consume foods rich in iron, such as red meats, liver, and whole-grain and enriched breads and cereals. Teenagers have increased iron needs because of growth. Women and teen athletes should probably be tested for iron deficiency and may need to take iron supplements.

The Importance of Fluids

Dehydration (lack of water) interferes with the body's ability to regulate temperature and chemical reactions. During exercise, people lose more body fluids through sweat, so they need to be especially careful to keep their bodies properly hydrated.

In hot, humid weather, sweat doesn't evaporate well into the already saturated air. Body heat builds, and the body sweats more in an unsuccessful attempt to cool down. Heatstroke, overheating that leads to collapse, can result. Exercisers should drink lots of fluids before and during activity, wear light clothing, and take rest periods in the shade to prevent heatstroke.

In cold weather, exercisers need to avoid *hypothermia*, or loss of body heat. They should dress warmly and keep their heads covered. Drinking plenty of warm or room-temperature liquids is important because the body still sweats and needs fluids.

During heavy exercise, the body can lose two to four quarts of fluid every hour. The body replaces lost water slowly, so exercisers need to drink fluids before, during and after working out. People may not recognize their thirst during exercise, so body fluid levels could get dangerously low. The body does not adapt to less water. Water should never be withheld during exercise. This practice is dangerous and can result in death.

Drinking water during exercise does not cause muscle cramps. Cramps are actually caused by a depletion of water and sodium due to excessive sweating, not by drinking water.

People should drink as much water as they want during exercise. This fluid intake not only prevents heat cramps, but it helps keep exercisers alert and quick on their feet.

Many commercial drinks have been marketed to athletes, including some that attempt to mimic the chemical composition of sweat. There is usually no reason, even in world-class sporting competition, to use these drinks.

Commercial drinks offer no advantages over plain water, which enters tissues quickly and cools the body. However, for endurance athletes who compete for more than two hours at a time, a drink that supplies glucose can be beneficial. For other athletes, the use of special athletic liquids is a matter of personal preference.

No one should drink alcohol while exercising. Alcohol is a diuretic. It removes fluid from tissues, making hypothermia, heatstroke and dehydration more likely. It also alters perceptions, dulls reaction time, decreases strength and endurance, and impairs judgment.

The Diet of Champions

No diet is perfect for every active person, but the following general guidelines may enhance performance and health.

- **Eat a diet composed mostly of nutrient-dense foods.** Nutrient-dense foods supply a maximum of vitamins and minerals and provide energy. Fresh foods that are low in fat and sugar are nutrient-dense.

- **Eat for energy.** The energy demands of sports can be great, so athletes need full glycogen stores. A diet that is high in carbohydrates (65% of total Calories or more), low

in fat (20% or less), and adequate in protein (12–15%) helps supply the glucose for glycogen production. Such a diet can also:

- lower the risk of heart disease and cancer
- help control weight
- provide adequate fiber

- **Eat light preperformance meals.** Three to four hours before an event, participants should eat 300 to 1,000 Calories of easy-to-digest food that contains fluids. Foods such as bread, potatoes, pasta and fruit juices are high in carbohydrates and low in fats. The time frame is important, because digestion interferes with muscle work. Three hours allows the stomach to empty before exercise.

- **Drink plenty of fluids.** The need for fluids can't be overstated.

Carbo Loading

Some athletes use a technique known as carbohydrate loading to increase the amount of glycogen stored in muscles. They begin training for an event by increasing exercise levels without restricting carbohydrates. During the week before the event, they gradually reduce the amount of exercise. They completely rest on the day before the event and eat high amounts of carbohydrate-rich foods.

This "carbo loading" helps performance in two ways. First, the glycogen can help athletes keep going for 90 minutes or more at a stretch. Second, as the glycogen breaks down it releases water that helps meet fluid needs.

Research also shows that eating a high-carbohydrate meal within two hours after exercise helps increase glycogen stores 300%.

1-Minute Facts

- Everyone who exercises needs to eat enough food to maintain reasonable, healthy body weight.
- A high-carbohydrate diet enhances athletic endurance by ensuring the body has adequate stores of glycogen.
- The longer the duration of exercise, the more energy fat contributes.
- Protein is not a major source of energy.
- There is no evidence that vitamin supplements increase physical performance.
- Endurance athletes, especially women, need to be careful to get enough iron.
- Exercisers should drink fluids before, during and after workouts.
- Most commercial sports drinks offer no advantages over plain water.
- Active people need to eat nutrient-dense foods that supply energy, eat light preperformance meals, and drink plenty of fluids.

Glossary

A

anemia—A condition in which blood lacks red blood cells or the cells are deficient in hemoglobin.

atherosclerosis—A disease in which the arteries become clogged with fats and other substances that form plaque.

C

calorie—A unit for measuring heat energy; the energy value of foods. (See also kilocalorie.)

carbohydrate—A nutrient composed of carbon, hydrogen and oxygen; the body's preferred form of energy.

carcinogenic—Capable of causing cancer.

cholesterol—A fatty substance found in animal products and manufactured by the body. High amounts are associated with cardiovascular disease.

complete protein—A protein source that contains all nine of the essential amino acids.

complementary protein—Two or more protein foods that when eaten together provide all nine of the essential amino acids.

cretinism—Irreversible physical and mental retardation in an infant; can be caused by severe iodine deficiency during pregnancy.

D

diuretic—A substance or drug that increases the body's elimination of fluids.

E

energy—A measure of the ability to do work.

essential—Required, as nutrients required by the body for normal function.

F

fat—A nutrient that is the body's second major source of energy and the preferred means of storing energy.

G

goiter—An abnormal swelling of the thyroid gland due to iodine deficiency.

H

heatstroke—A failure of the body's heat-regulating mechanisms, caused by excessive exposure to heat.

high-density lipoprotein (HDL)—A type of lipoprotein that carries cholesterol from the bloodstream to the liver, where it can be processed.

hypertension—Chronic abnormally high blood pressure.

hypothermia—A below-normal body temperature.

K

kilocalorie—A unit of 1,000 calories; also written as kcal or Calorie.

L

lacto-ovo-vegetarian—A type of vegetarian diet that includes dairy products and eggs.

lacto-vegetarian—A type of vegetarian diet that includes dairy products.

lipid—A compound that consists of fat and other substances.

lipoproteins—Molecules composed of lipids and proteins that carry triglycerides and cholesterol through the bloodstream.

low-density lipoprotein (LDL)—A type of lipoprotein that carries a large amount of cholesterol in the bloodstream.

M

metabolize—To change by a chemical process.

monounsaturated fat—A type of fat found mainly in olive, peanut and canola oils.

O

obesity—A condition in which an excessive proportion of body tissue is fat.

osteoporosis—A condition resulting from the decline in bone mineral content, which makes bones susceptible to fracture.

oxidation—Adding oxygen to compounds to yield energy and release waste in the form of carbon dioxide and water.

P

polyunsaturated fat—A type of fat found mainly in certain vegetable oils and some fish.

protein—A major nutrient composed of carbon, hydrogen, oxygen and nitrogen, whose major function is the growth, maintenance and repair of body tissues.

R

risk—The likelihood of injury, damage or other negative consequences following an action.

S

saturated fat—A type of fat usually found in animal sources; solid at room temperature.

T

trace—Refers to minerals, including iron, zinc, manganese, copper, iodine and cobalt, that each account for 0.005% or less of body weight.

V

vegans—People who follow a strict vegetarian diet that includes no animal food sources or dairy products.

vegetarians—People who exclude meat products from their diet; may be lacto-ovo vegetarians, lacto-vegetarians or vegans.

Resources

American Alliance for Health, Physical Education, Recreation and Dance
1900 Association Dr.
Reston, VA 22091
703-476-3400

American Anorexia/Bulimia Association, Inc.
418 East 76 St.
New York, NY 10021
212-734-1114

American Cancer Society National Office
1599 Clifton Road NE
Atlanta, GA 30329
800-255-2352
Response System:
800-ACS-2345

American College of Sports Medicine
P.O. Box 1440
Indianapolis, IN 46206
317-637-9200

American Dental Association
211 East Chicago Ave.
Chicago, IL 60611
312-440-2500

American Diabetes Association
1660 Duke St.
Alexandria, VA 22314
800-ADA-DISC

American Dietetic Association
216 West Jackson Blvd., Suite 800
Chicago, IL 60606
312-899-0040

American Heart Association
7272 Greenville Ave.
Dallas, TX 75231
800-242-1793

American Institute of Nutrition
9650 Rockville Pike
Bethesda, MD 20814
301-530-7050

American Medical Association
Department of Health Education
515 N. State St.
Chicago, IL 60610
312-464-5000
Customer service:
800-621-8335

American Pharmaceutical Association
2215 Constitution Ave. NW
Washington, DC 20037
202-628-4410

American Psychiatric Association
1400 K St. NW
Washington, DC 20005
202-682-6000

American Psychological Association
750 First St. NE
Washington, DC 20002
202-336-5500

American Public Health Association
1015 15th St. NW
Washington, DC 20005
202-789-5600

American Red Cross
17th & D Streets NW
Washington, DC 20006
202-737-8300

American School Health Association
P.O. Box 708
Kent, OH 44240
216-678-1601

Anorexia Nervosa and Related Eating Disorders
P.O. Box 5102
Eugene, OR 97405
503-344-1144

Cancer Information Service
Office of Cancer Communications
National Cancer Institute
Building 31, Room 10A24
9000 Rockville Pike
Bethesda, MD 20892
800-4-CANCER

Centers for Disease Control and Prevention (CDC)
1600 Clinton Rd. NE
Atlanta, GA 30333
404-639-3311

Clearinghouse on Health Indexes
Division of Analysis
Office of Analysis and Epidemiology
National Center for Health Statistics
Centers for Disease Control
6525 Belcrest Rd.
Room 790
Hyattsville, MD 20782
301-436-7035

Community Nutrition Institute
2001 5th St. NW, Suite 530
Washington, DC 20009
202-462-4700

The Consumer Information Center
Pueblo, CO 81009
719-948-2240

Environmental Protection Agency
Public Information Center
PM-211B
401 M St. SW
Washington, DC 20460
202-260-7751

Food and Drug Administration
Center for Food Safety and
Applied Nutrition
200 C St. SW
Washington, DC 20204
202-205-4168

The Food and Nutritional
Information Education
Resources Center
National Agriculture Library
10301 Baltimore Blvd., Room 304
Beltsville, MD 20705-2351
301-504-5719

Food Research and Action Center
1875 Connecticut Ave. NW,
Suite 540
Washington, DC 20009
202-986-2200

Institute of Food Technologies
221 North LaSalle St.
Chicago, IL 60601
312-782-8424

March of Dimes, Birth Defects
Foundation
Public Health Education
Department
1275 Mamaroneck Avenue
White Plains, NY 10605
914-428-7100

National Anorexic Aid Society
1925 E Dublin-Granville Rd.
Columbus, OH 43229
614-436-1112

National Clearinghouse for
Maternal and Child Health
8201 Greensboro Dr., Suite 600
McLean, VA 22102
703-821-8955, ext. 254 or 265

National Diabetes Information
Clearinghouse
Box NDIC
9000 Rockville Pike
Bethesda, MD 20892
301-468-2162

National Digestive Diseases
Information Clearinghouse
P.O. Box NDDIC
Bethesda, MD 20892
301-468-6344

National Health Information
Center
Office of Disease Prevention and
Health Promotion
P.O. Box 1133
Washington, DC 20013
800-336-4797

National Heart, Lung and Blood
Institute
Education Programs Information
Center
P.O. Box 30105
Bethesda, MD 20824-0105
301-251-1222

National Institute of Mental Health
5600 Fishers Lane,
Room 7C-02
Rockville, MD 20857
301-443-4513

National Kidney and Urologic Diseases Information Clearinghouse
Box NKUDIC
9000 Rockville Pike
Bethesda, MD 20892
301-468-6345

National Self-Help Clearinghouse
25 W. 43rd St., Room 620
New York, NY 10036
212-354-8525

Nutrition Foundation, Inc.
1126 16th St. NW,
Suite 300
Washington, DC 20036
202-659-0074

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